東南極セールロンダーネ山地における左ずれトランスプレッションによる褶曲形成前後のテクトニクス

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Possible tectonics models for mylonite-forming events before coastline-parallel folding in the Sør Rondane Mountains, East Antarctica

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In this paper we clarify the history of deformation in the Sør Rondane Mountains (SRMs), eastern Dronning Maud Land (DM, East Antarctica, and construct a form-line contour map of the metamorphic and plutonic rocks in order to comprehend their structural features and provide constraints on the collisional tectonics of East and West Gondwana. We divide the deformational history in the SRMs into 13 stages (D1–D13). The tectonic regime varied frequently from extension (D3–D4) to layer-normal compression and layer-parallel extension (D5), to compression (D6), top-to-the S shearing (D7), top-to-the SE shearing and sinistral strike-slip (D8), compression (D9–D11), and finally extension related to dextral shearing (D12–D13). Three possible tectonics models for D7 and D8 mylonite-forming events before the D9 deformation can be considered as follows: extensional tectonics model, positive flower structure model and rotated mylonite model. In the former model, D7 and D8 indicate major extensional tectonic activity in the southern part of the East African and Antarctic Orogen (EAAO) before the Pan-African compressional event, and after the c. 600 Ma peak of metamorphism. In the latter two models, D7 and D8 mylonites may have resulted from the compressional events. In the positive flower structure model, the SRMs are the southern half of the E-trending positive flower structure. The flower structure model needs top-to-the N shear zones to the north of the SRMs. In the rotated mylonite model, the present S-dip of the D7 and D8 mylonites results from the rotation and folding of originally N-dipping reverse (top-to-the S-SE, normal-sinistral shear, present day coordinates) mylonites. The Pan-African compressional event resulted in the formation of upright folds with horizontal axes that curve along the coastline in central to eastern DML during the D9 deformation that took place between 600 and 560 Ma. The coastline-parallel fold axes and subvertical axial-planes correspond to the X-axes and the XY-planes, respectively, of strain ellipsoids that were progressively rotated counterclockwise toward the central parts of a sinistral shear zone. Therefore, the curved fold axes and axial-planes suggest the EAAO acted as a zone of sinistral transpression during the collision of parts of East and West Gondwana. Around 560–550 Ma, during D12, parallel dyke swarms of granitic pegmatite were intruded along normal faults under a regime of NNE–SSW horizontal extensional stress. The extensional paleo-stress and its related structures suggest dextral rather than sinistral shearing took place along the north-trending EAAO during this late Pan-African event. There is the possibility of a reversal of trans-orogen asymmetry from sinistral to dextral in the southern part of the EAAO. The dyke swarms are considered to have been the heralds of the voluminous 530–500 Ma A-type granite intrusions in DML. At the same time, the Lützow–Holm Complex was under a non-extensional tectonic regime, and may have been situated in a different orogen from the EAAO.